REMARKS/ARGUMENTS

Favorable consideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-4, 8-9, 11-15, and 20-31 are pending in the application, with Claims 1 and 20 amended by the present amendment.

In the outstanding Office Action, Claims 1-3, 8-9, 11-15, 20-23 and 25-31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Teoule et al. (U.S. Patent No. 5,837,859) in view of Ohkawa (U.S. Patent No. 5,486,337); Claims 1-4, 8-9, 11-15 and 20-23 were rejected under 35 U.S.C. § 102(b) as being anticipated by Livache et al. (Nucleic Acids Research, 1994, 22(15): 2915-2921) in view of Ohkawa.

Applicants acknowledge with appreciation the personal interview between the Examiner and Applicants' representative on October 4, 2004. During the interview, the Examiner acknowledged that the combination of Ohkawa with Teoule or Livache would be non-functional because the application of an electrical current in Ohkawa to the solutions used in Teoule or Livache would cause the polymerization to occur in the pipette rather than on a sample surface. The Examiner also acknowledged that both Teoule and Livache fail to disclose or suggest Applicants' claimed electrode and deposit site configuration. The Examiner indicated that the pending rejections would be withdrawn upon receipt of Applicants' formal comments. The Examiner also acknowledged that the basis of the rejection of the claims in view of Livache and Ohkawa is 35 U.S.C. § 103(a) rather than 35 U.S.C. § 102(b), as indicated in the Official Action.

In response to the notice of non-compliance with 37 C.F.R § 1.821-1.825 regarding supplemental disclosure of nucleotide/amino acid sequences, Applicants have amended the

specification to remove recitation of the nucleotide/amino acid sequences cited in the Official Action.

Claims 1 and 20 are amended to more clearly describe and distinctly claim Applicants' inventions by reciting that the electrochemical fixing of the ligand is a result of distributing and simultaneous circulation of an electric current. No new matter is added.

Briefly recapitulating, Claim 1 is directed to a method for electrochemically fixing a matrix of deposits of a ligand on chosen sites of a conductive carrier or of conductive zones of a carrier. The method includes use of an electrode and a carrier laterally movable relative to one another. The electrode is configured to distribute a discrete volume of a solution containing the ligand coupled to an electropolymerisable monomer. The method comprise the steps of: a) positioning the electrode above the site, b) distributing with the electrode on the site the discrete volume of solution and simultaneously circulating an electric current from the electrode to the site to polymerize the electropolymerisable monomer so as to electrochemically fix the ligand on the site. The method also includes repositioning the electrode and repeating the steps of distributing and simultaneously circulating an electric current so as to create the matrix. The ligand positioning and distributing steps recited in Claim 1 requires use of less reaction medium than conventional methods and therefore economizes the molecules of biological interest. In particular, the invention allows depositing on the same carrier different ligands in parallel.[1] Also, with the claimed invention the size of the droplets made on the carrier may be adjusted whereas in conventional mechanical methods droplet sizes cannot be less than 50-100 μm.[2]

Teoule[3] and Livache[4] each disclose a method for fixing oligonucleotide (ODN) on a carrier *via* an electrochemical synthesis of a (pyrrole/ODNpyrrole) copolymer, as well as the

---

[1] Specification, page 7, lines 16-17.
[2] Specification, page 14, line 17 – page 14, line 25.
[3] Teoule, Fig. 4A and column 9, lines 40-61.
[4] Livache, the top part of Fig. 3, page 2917.

use of this method for producing a matrix of ODN. However, in these documents, the carrier is constituted by a working electrode which is placed into an electropolymerization cell filled with a solution containing pyrrole + an ODN bearing a 5' pyrrole group, and which is immersed into this solution. A counter-electrode and a reference electrode are also immersed into the solution, the counter-electrode being placed below the working electrode. The working electrode and the counter-electrode being connected to a potentiostat. Thus, the synthesis of the copolymer is achieved by application of cyclic variations of electrical potential and leads to the deposit of a solid film of copolymer on the whole surface of the working electrode.

In order to carry out a matrix of ODN, Teoule and Livache each use a matrix of electrodes. In Teoule, the matrix of electrodes is composed of four wires included in a glass cylinder, three wires serving as working electrodes and the fourth wire serving as counter-electrode.[5] In Livache, the matrix of electrodes is also composed of four wires included in a glass cylinder but all of them serve as working electrodes and the counter-electrode is represented by a distant electrode.[6]

In both Teoule and Livache, the matrix of electrodes is placed into an electropolymerization cell together with a reference electrode and, in the case of Livache, with a counterelectrode which is located below the cylinder including the working wires. The matrix of electrodes as disclosed by Teoule and Livache may be used for carrying a matrix of different ODN, in which case one working wire represents one site for the fixation of one ODN.

For example, Livache states that "Three different ODN were successively copolymerized on three different electrodes. Each synthesis consists in i) selective electrode switching, ii) filling up the electrochemical cell with a solution containing the modified

---

[5] Teoule, Fig. 11A and column 13, Example 5.
[6] Livache, bottom part of Fig. 3, page 2917.

ODN, iii) electrosynthesis of the ppyr, and iv) rinsing the cell and the electrodes to avoid any cross contamination." Livache further explains that the first electrode is coated with polypyrrole without any ODN for serving as negative control, the second electrode with ODN-Tpyrrole, the third electrode with ODN-Apyrrole and the fourth electrode with ODN-Cpyrrole.[7] The matrix of ODN so obtained is constituted of three wires, each of them being coated with a solid film of a (pyrrole/ODNpyrrole) copolymer different from the copolymers coating the two other wires. Meanwhile, the matrix of electrodes disclosed in Teoule is composed of ten gold electrodes arranged on a glass plate.[8] As with Livache, the active zone of the matrix of electrodes of Teoule is immersed into the solution containing polypyrrole and ODN-pyrrole.

However, Applicants submit that neither Teoule nor Livache disclose or suggest use of an electrode and carrier laterally movable the one relative to the other as recited in Applicants' Claim 1. Therefore, neither Teoule nor Livache disclose or suggest Applicants' claimed step of positioning said electrode above the site of the carrier where the ODN is intended to be fixed. Applicants further submit that neither Teoule nor Livache disclose or suggest an electrode configured to distribute discrete volumes of a solution as recited in Applicants' Claim 1. Also, neither Teoule nor Livache disclose or suggest Applicants' claimed step distributing a one discrete volume of the solution, and simultaneously circulating an electric current from said electrode to said site. Finally, neither Teoule nor Livache disclose Applicants' claimed repositioning and repeating steps. Because of these deficiencies, neither Teoule nor Livache are capable of parallel solution distribution as is possible with Applicants' claimed invention.

Applicants have considered Ohkawa and submit this reference does not cure the deficiencies of Teoule or Livache. First, Applicants note that Ohkawa does not disclose a

---

[7] Livache, right column of page 2920.
[8] Teoule, Fig. 12 and column 14, Example 6.

method for producing a matrix of ligands electrochemically fixed on sites of a carrier. Instead, Ohkawa discloses a method for depositing and moving minute, nanovolume liquid droplets of aqueous solutions from one point to another of a test surface for analysis, detection, or reaction with other droplets. According to this method, electrostatic forces are generated and controlled to move the droplets, where the droplets may be temporarily retained by adhesion on electrodes located on the test surface. However, in Ohkawa the droplets are never definitively fixed on said test surface. Therefore, Applicants submit there is no teaching, suggestion, or motivation, either explicitly or implicitly, in either reference to combine the droplet movement of Ohkawa with the electrodes of Teoule or Livache to arrive at Applicants' inventions recited in Claim 1. Thus, Applicants submit it is only through an impermissible hindsight reconstruction of Applicants' invention that the rejection of Claim 1 can be understood.[9]

Moreover, Applicants submit the combination of Teoule or Livache with Ohkawa cannot have led to Applicants' claimed inventions. Ohkawa discloses an electrostatic pipette for dispensing the droplets on the carrier, which consists of a hollow non-wettable tube provided with a tubular wettable primary electrode and a series of annular non-wettable secondary electrodes spaced axially along said tube. The application of sequential voltages between primary electrode and secondary electrodes allows moving the droplets included in the pipette from one end to the other end of the pipette.[10] Applicants submit that one skilled in the art would know that such a dispensing method and such an electrostatic pipette are fully unsuitable for distributing a ligand coupled to an electropolymerizable polymer since they would lead to the polymerization of the polymer inside the pipette and consequently to

---

[9] MPEP § 2143.01 "Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge of one of ordinary skill in the art."

[10] Ohkawa, Fig. 4 and column 7, lines 10-43.

the fixation of the ligand on the internal wall of the pipette, and not on the surface of a carrier.

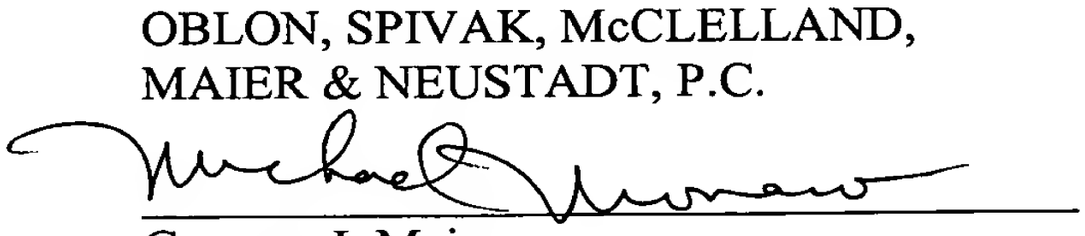
Finally, Applicants submit it is impossible for any reference to cure the deficiencies of Teoule or Livache because Teoule or Livache fail to disclose an electrode that it is separate from a deposit site. That is, it is impossible to reposition the working electrodes in Teoule or Livache relative to charged electrodes as they are bundled together before immersing in the container.

As none of the cited prior art, individually or in combination, disclose or suggest all the elements of independent Claim 1, Applicants submit the inventions defined by Claim 1, and all claims depending therefrom, are neither anticipated nor rendered obvious by the asserted prior art for at least the reasons stated above.[11] For similar reasons, Applicants submit the inventions defined by Claim 20, and all claims depending therefrom, are neither anticipated nor rendered obvious by the asserted prior art for at least the reasons stated above

Accordingly, in view of the present amendment and in light of the previous discussion, Applicants respectfully submit that the present application is in condition for allowance and respectfully request an early and favorable action to that effect.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Attorney of Record
Registration No. 25,599
Michael E. Monaco
Registration No. 52,041

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/03)
GJM/MEMO/kkn
I:\ATTY\MM\AMENDMENT\902\211842.RESP DUE DEC.30..DOC

[11] MPEP § 2142 "...the prior art reference (or references when combined) must teach or suggest **all** the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)."